



10NM80

Power MOSFET

10A, 800V N-CHANNEL SUPER-JUNCTION MOSFET

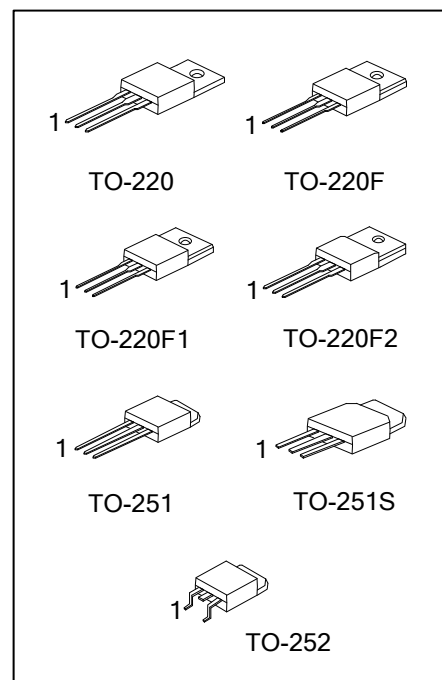
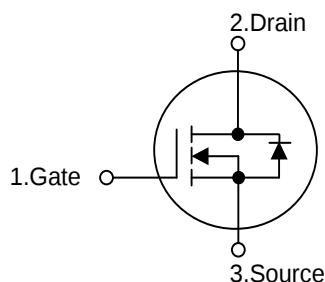
DESCRIPTION

The UTC 10NM80 is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 0.6 \Omega$ @ $V_{GS}=10V$, $I_D=5.0A$
- * By using Super Junction Structure
- * Fast Switching
- * With 100% Avalanche Tested

SYMBOL



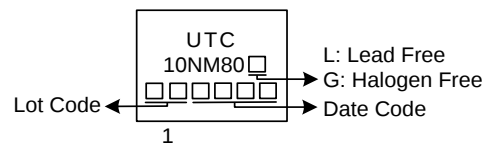
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10NM80L-TA3-T	10NM80G-TA3-T	TO-220	G	D	S	Tube
10NM80L-TF3-T	10NM80G-TF3-T	TO-220F	G	D	S	Tube
10NM80L-TF1-T	10NM80G-TF1-T	TO-220F1	G	D	S	Tube
10NM80L-TF2-T	10NM80G-TF2-T	TO-220F2	G	D	S	Tube
10NM80L-TM3-T	10NM80G-TM3-T	TO-251	G	D	S	Tube
10NM80L-TMS-T	10NM80G-TMS-T	TO-251S	G	D	S	Tube
10NM80L-TN3-R	10NM80G-TN3-R	TO-252	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

10NM80G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TMS: TO-251S, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



■ **ABSOLUTE MAXIMUM RATINGS** ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	10	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Current (Note 2)		I_{AR}	3.0	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	715	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.29	V/ns
Power Dissipation	TO-220	P_D	80	W
	TO-220F/TO-220F1		29	W
	TO-220F2			
	TO-251/TO-251S TO-252		68	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L=159\text{mH}$, $I_{AS}=3.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 10\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-220F1/TO-220F2			
	TO-251/TO-251S		110	$^\circ\text{C/W}$
	TO-252			
Junction to Case	TO-220	θ_{JC}	1.56	$^\circ\text{C/W}$
	TO-220F/TO-220F1		4.31	$^\circ\text{C/W}$
	TO-220F2			
	TO-251/TO-251S TO-252		1.84 (Note)	$^\circ\text{C/W}$

Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

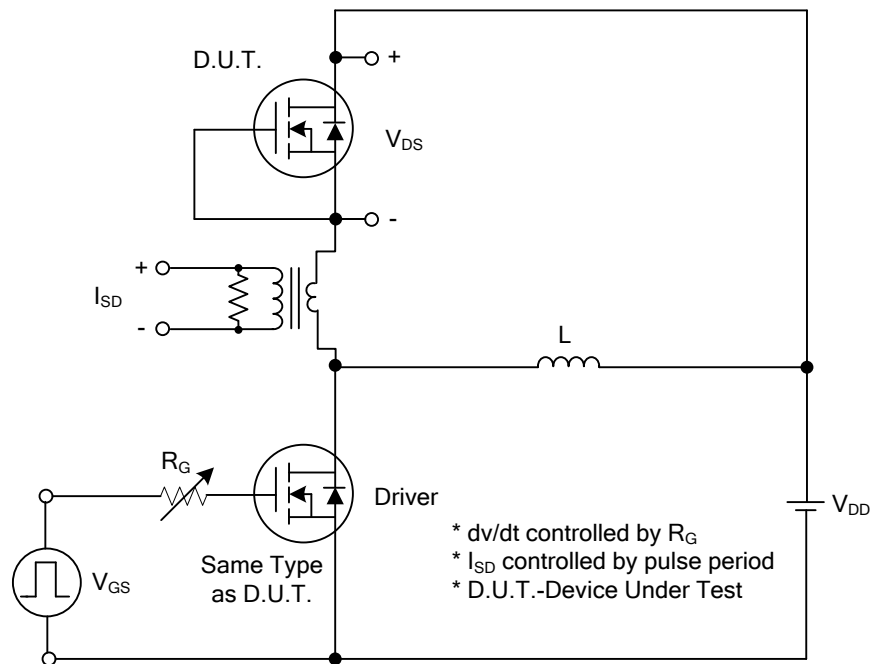
ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V ,V _{GS} =±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =5.0A			0.6	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		930		pF
Output Capacitance	C _{OSS}			440		pF
Reverse Transfer Capacitance	C _{RSS}			16		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =640V, V _{GS} =10V, I _D =10A , I _G =1mA (Note 1, 2)		36		nC
Gate to Source Charge	Q _{GS}			6		nC
Gate to Drain Charge	Q _{GD}			12		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =10A, R _G =25Ω (Note 1, 2)		12		ns
Rise Time	t _R			22		ns
Turn-OFF Delay Time	t _{D(OFF)}			106		ns
Fall-Time	t _F			40		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				10	A
Maximum Body-Diode Pulsed Current	I _{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =15A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =3.0A, V _{GS} =0V		455		ns
Body Diode Reverse Recovery Charge	Q _{rr}	dl _F /dt=100A/μs		6.4		μC

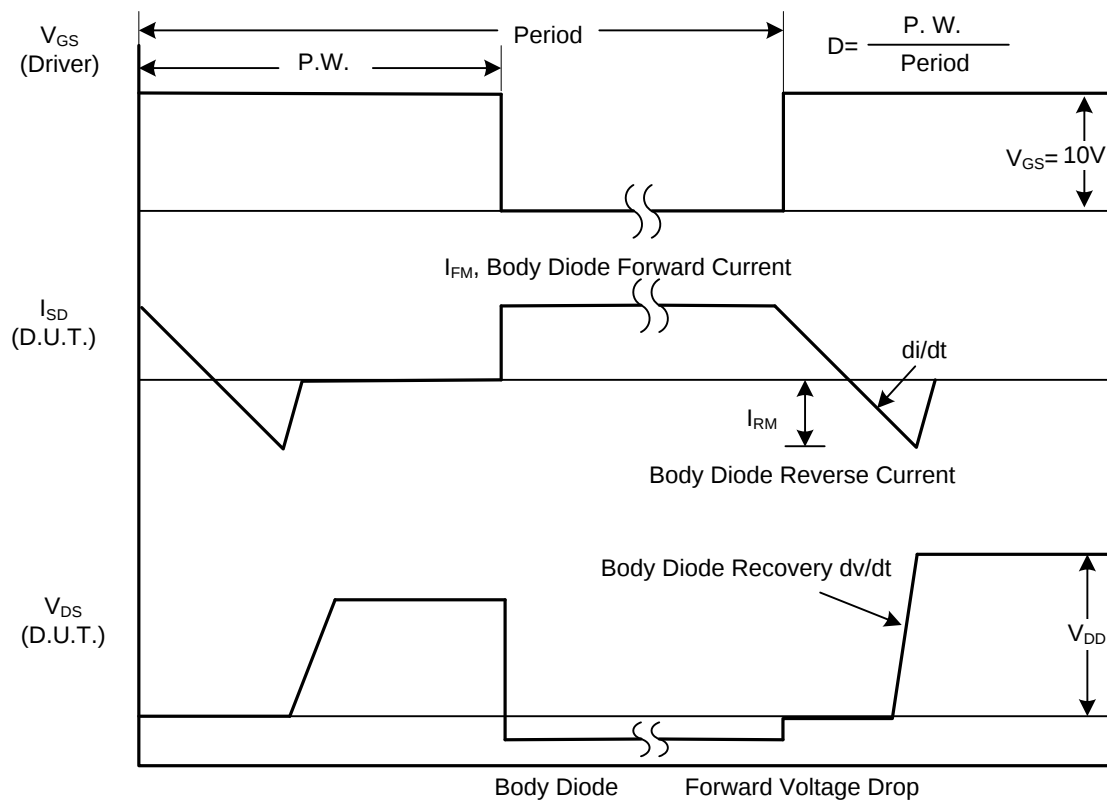
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

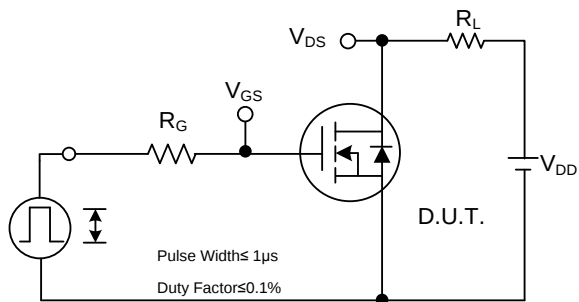


Peak Diode Recovery dv/dt Test Circuit

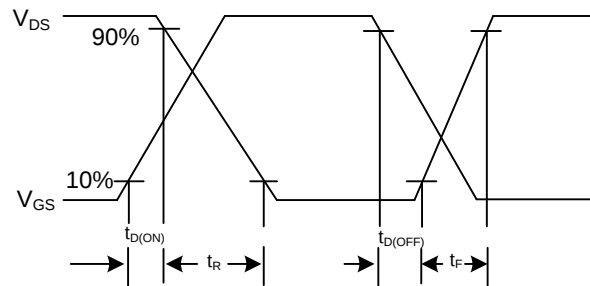


Peak Diode Recovery dv/dt Waveforms

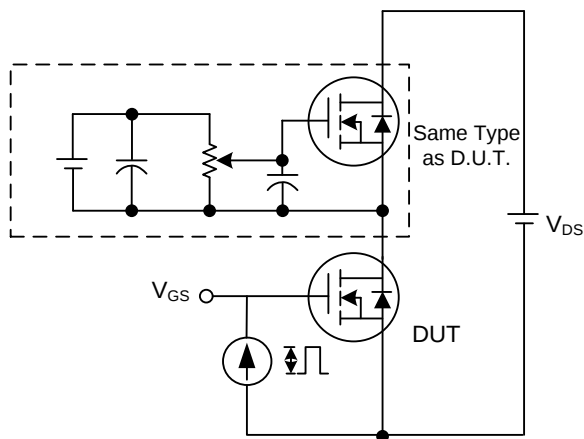
■ TEST CIRCUITS AND WAVEFORMS



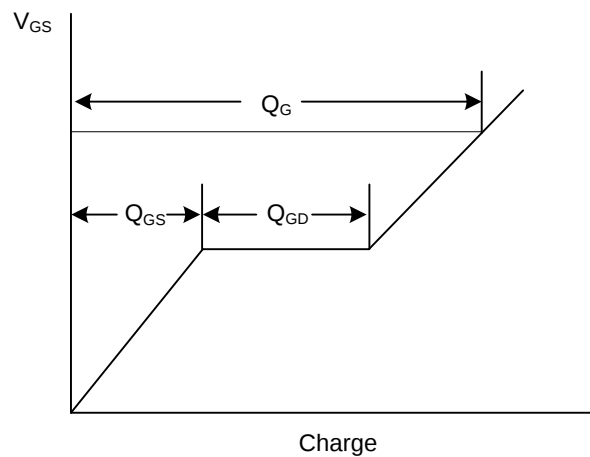
Switching Test Circuit



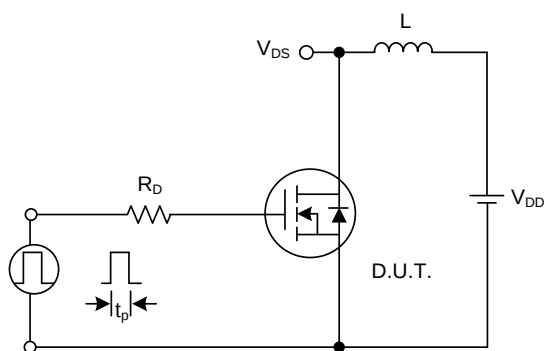
Switching Waveforms



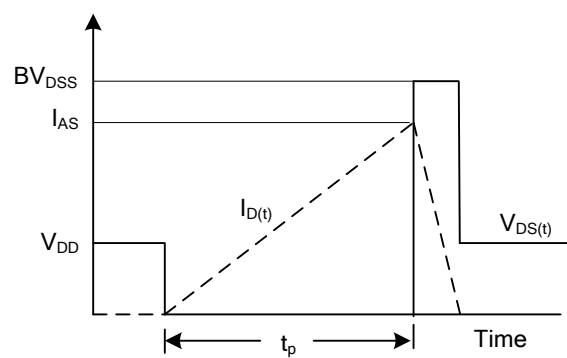
Gate Charge Test Circuit



Gate Charge Waveform

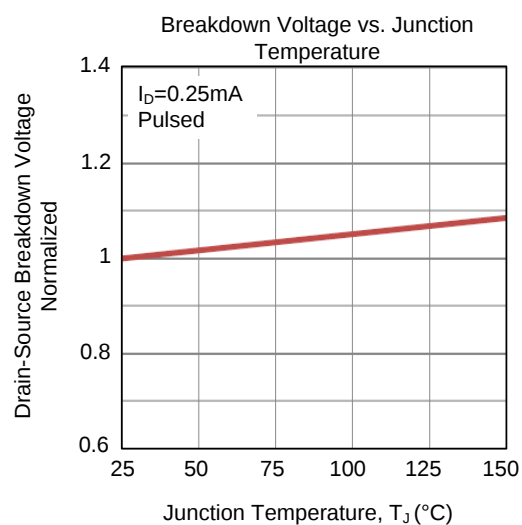
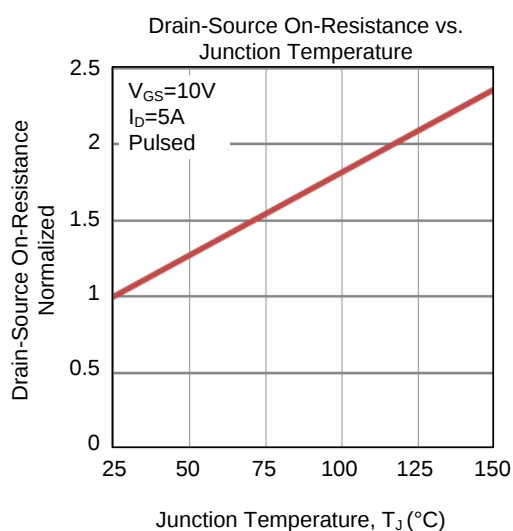
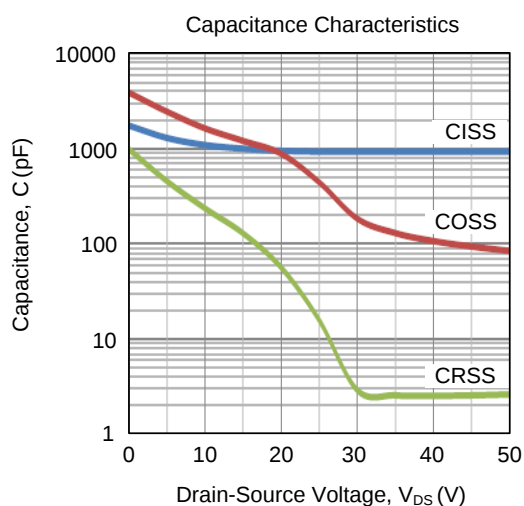
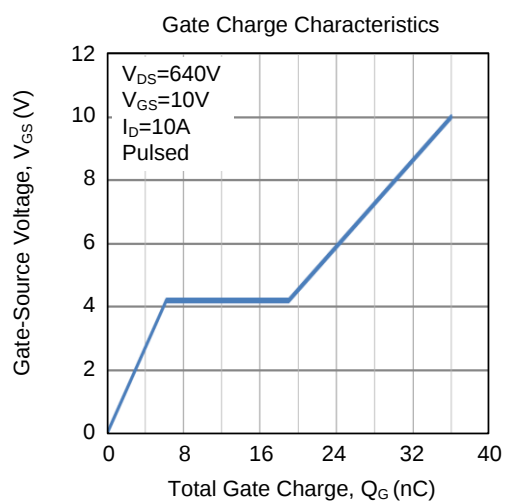
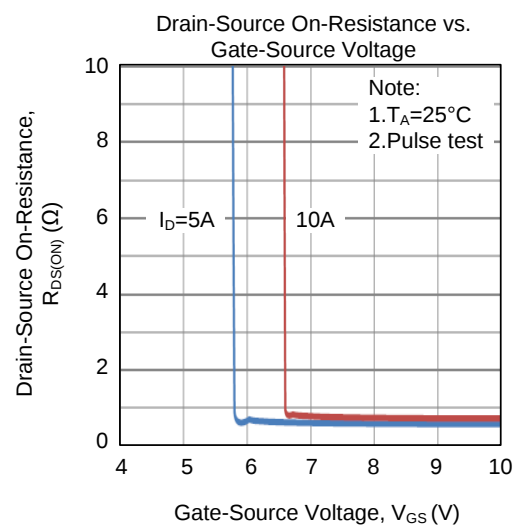
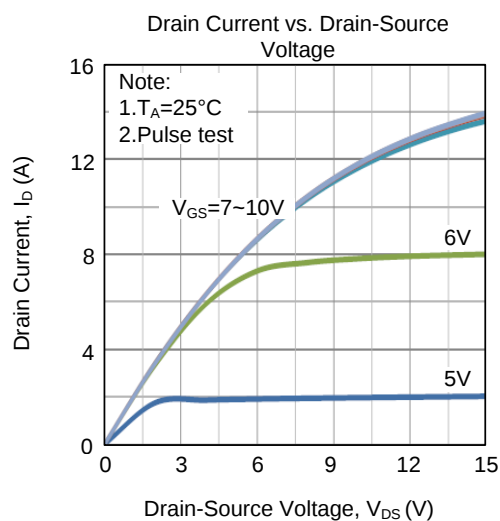


Unclamped Inductive Switching Test Circuit

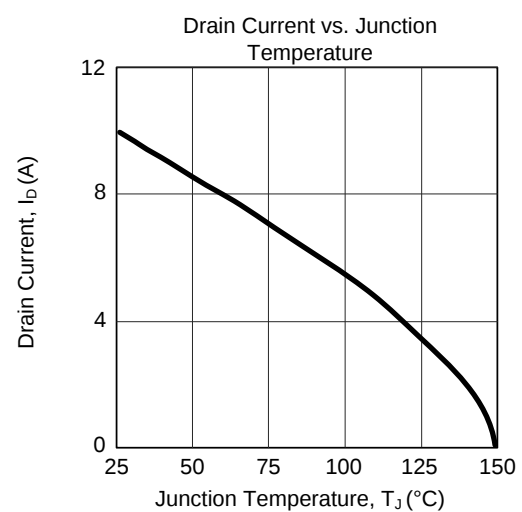
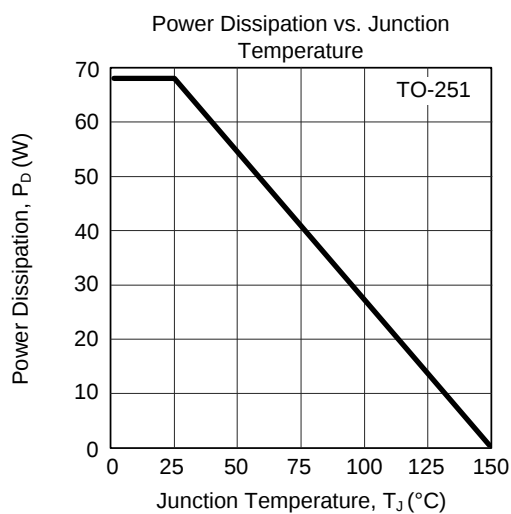
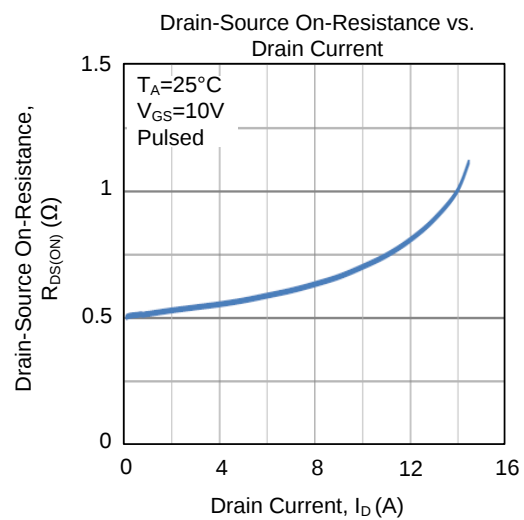
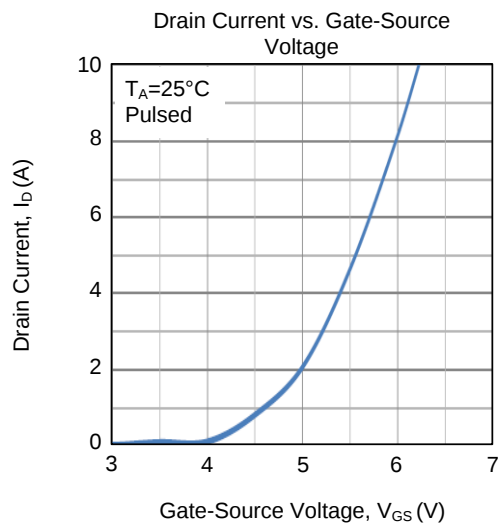
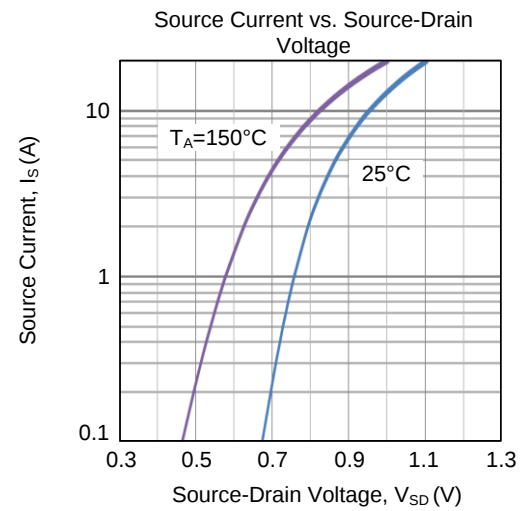
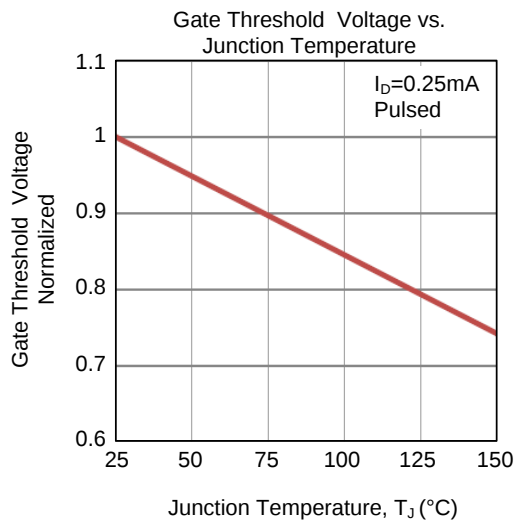


Unclamped Inductive Switching Waveforms

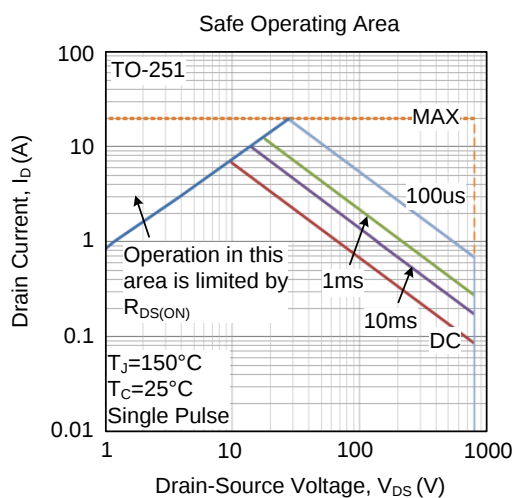
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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